

THE USE OF SILVER WIRE FOR THE CURE OF LARGE HERNIÆ,¹

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THE object of writing this paper is to draw attention to a somewhat neglected field of reparative surgery. I confess that when I first began to use silver wire for the cure of herniæ I was skeptical as to its value. The more I have used it, the more convinced I have become of its great value. True, there are certain technical points which must be borne in mind to get the best results. Increasing experience in this respect has taught us valuable lessons.

The subject was first brought to our attention by Witzel and Goepel, almost simultaneously, in 1900. Though almost six years have elapsed, with the exception of articles by Willy Meyer, Bartlett, and Perry, but little has been written on the subject. Witzel used a number of sutures of silver wire with which he partly closed the hernial opening, and he then passed thin silver wires in every direction across the opening still remaining. This was a tedious and time-consuming method. Goepel was the first to employ the ready-made filigree of silver wire. He reported eleven cases of ventral and umbilical and seven cases of inguinal hernia, in which he had used the filigree. There were only two failures, due to the formation of hæmatoma, which necessitated the removal of the filigree. If all bleeding he carefully arrested no hæmatoma will develop. Furthermore, we now know that even if there is some infection of the wound, with a resulting sinus, the filigree need not be removed. The wound will ultimately heal and the filigree remain in place. The largest filigree used by Goepel was four

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and a-quarter by six and three-quarter inches. This gives an idea of what the filigree can do in the cure of hernia.

My interest in the subject was first aroused by an excellent and convincing paper by Bartlett, which appeared in the *ANNALS OF SURGERY* in 1903. The filigree I have employed has been that devised by Bartlett, and I have followed his directions closely. He advised the use of the ready-made filigree, made of thin wire, not heavier than gauge No. 30. The heavier wire is not resilient enough, and does not adapt itself so well to the tissues, and in consequence it is apt to cause irritation. Another advantage of the filigree over silver-wire sutures is the fact that it can be introduced very quickly. Furthermore, and this is a matter of great importance, the filigree can be placed between the tissues at a much greater distance from the edges of the opening than would be possible in passing a needle. It should widely overlap the hernial opening on all sides. No sutures are required to hold the filigree in place. If anyone doubts the correctness of this statement, he has but to remember what happens when we inadvertently leave a piece of gauze in a wound. How quickly are the meshes of the gauze filled with granulation tissue, which anchors it in place so firmly that it can only be removed with the greatest difficulty. The same process goes on with the filigree. In a few weeks it is so firmly anchored in place that great force is required for its removal. This has been proven experimentally on animals. Another advantage in not suturing the filigree in place is the fact that it can then better adapt itself to the surrounding tissues, and there is less likelihood of its causing any irritation. If properly made and properly inserted it should cause no discomfort whatever; the patient should not be aware of its presence.

The form of filigree used by the writer has been that devised by Bartlett, and described in his article in Volume 38, *ANNALS OF SURGERY*, 1903. As is well known, scars in the abdominal wall generally spread most in a lateral direction. The filigree, which can be readily made by anyone,

depends for its efficacy upon the fact that all but one of the wires run across the long axis of the hernial opening. The filigree should overlap the opening by at least an inch all around. It is so made that each cross-wire ends in a loop, thus obviating sharp ends. If sutures of silver wire are used, they should not attempt to approximate the tissues (a frequent cause of failure). The sutures should be made into a sort of filigree, they should fill in the gap of the hernial opening, and there must be no tension whatever. It is always better to depend on two layers of silver; either two filigrees in two different planes, or one filigree and one reinforcing layer of silver sutures, provided the superficial muscles or fascia can be approximated without any tension. In general it is well to place the filigree as deeply as possible; sometimes it is not necessary to open the peritoneal cavity. But the filigree must extend well beyond the hernial opening on all sides. This necessitates dissecting up the muscles all around before introducing the filigree. Then the superficial plane of muscles or fascia may be united with silver-wire sutures, or a second filigree is introduced. Or, a filigree can be made by a running suture of wire that does not approximate the tissues, but simply fills in the gap. By following this method we have a double guard against recurrence of the hernia.

To show that by this method a hernia can be cured even in the presence of intra-abdominal tension which has been increased by pathological processes, reference may be made to two cases of Bartlett's. One was a case of hernia following Talma's operation for cirrhosis, and the other was a case of tubercular peritonitis. In the former case, in spite of the fact that there had several times been a decided reaccumulation of fluid, the filigree prevented the recurrence of the hernia. Of the ten cases in which Bartlett used it, he has never had to remove it, and he has observed some of his cases over two years.

The writer has used either the ready-made filigree or one made with running silver-wire sutures. Five of the cases were in the service of Dr. Howard Lilienthal, to whom I am

implied for permission to publish the cases. In a private case the wire was used for a ventral hernia following a median celiotomy. Fifteen months have elapsed and the patient has not only been cured of a troublesome hernia, but also has been free from any discomfort due to the presence of the wire. In two cases there were large inguinal hernie with wide separation of the tissues. One case was an umbilical hernia, one a ventral hernia following an injury, and one a ventral hernia following an operation for appendicitis. In no case has it been necessary to remove any of the wire.

CASE I.—Israel M., 53 years old, was first admitted to Mount Sinai Hospital in November, 1902. There had been a gradually-increasing right inguinal hernia for three years. The hernia had been irreducible for one year, and there had been several attacks of abdominal pain. On admission, the hernia was 58 cm. in circumference, and being only partly reducible it interfered with walking. On opening the sac, Dr. Lilienthal found it to contain small intestines, cecum and ascending colon, the latter firmly adherent to the sac. The adherent appendix was removed. The sac was so firmly adherent to the cord and testis that their detachment was impracticable. Accordingly, the testis, cord, and part of the sac, were removed; the intestines were replaced and the neck of the sac closed with chromic gut. The reduction of the intestines proved a difficult and tedious task, as more than half of the small intestines were in the sac. No sutures were used; the wound was packed with gauze and a compression bandage was applied. During the convalescence there was some sloughing of the fascia and of the deeper tissues. A large exudate which formed in the scrotum necessitated incision. Two and a half months after operation the man left the hospital with a healed wound. He was instructed to wear a truss and to return for observation.

Six and a half months later the man returned to the hospital. He stated that the hernia which could no longer be retained by a truss, was becoming progressively more troublesome. It was only partly reducible, and prevented the man from earning his living. Even when the dangers of the operation were explained

to him, he begged for relief. On August 19, 1903, I excised the scar tissue and opened the sac. It was found impossible to reduce the many coils of small intestine until the patient was placed in Trendelenburg's position. Even then it was only with great difficulty that the intestines were replaced. The sac was then freed from adhesions, tied off and allowed to slip back into the abdomen. The inguinal canal was so large that any approximating sutures were not to be thought of. The inguinal ring was narrowed by a purse-string suture of silver wire. A silver-wire filigree was now sutured over the inguinal canal, and the superficial fascia and skin brought together with interrupted sutures. A small gauze drain was left at the lower angle of the wound. Following the operation, the attempt was made to keep the foot of the bed elevated. On attempting to elevate it much the man complained of nausea and retching, and he became short of breath and cyanosed. Although the bowels moved daily, the patient was never comfortable. He became more and more restless and three days after operation he began to vomit. This continued, cyanosis and increased restlessness developed, and the man died six days after operation. Examination of the wound showed that the filigree was in place and that there had been no infection. Death was undoubtedly due to the fact that the abdominal cavity could not accommodate itself to the large amount of intestines which had been in the sac. Some of these large inguinal herniæ can surely be cured by the use of silver-wire filigree when all other methods are of no avail.

CASE II.—Mrs. Ray M., 34 years old, was referred to me by Dr. Louis Cohn. In October, 1900, she had been operated on by Dr. Bull, who removed diseased adnexa through a median incision. Drainage had been employed at the lower angle of the wound. Five months after the operation a hernia first showed itself at the lower portion of the scar. In July, 1901, the patient had a sudden attack of pain in the right side of the abdomen, accompanied by vomiting and fever. The attack lasted a week, and had been followed by a number of similar ones. The hernia gradually increased in size; it became painful and could no longer be retained by a truss.

Hernioplasty, October 27, 1904. The sac was opened by a transverse incision four and a half inches long and a median

incision two inches long. It contained a large mass of omentum. The neck of the sack was slightly to the left of the median line, but the hernial protrusion had lifted up the skin in front of the left rectus, and extended nearly in the flank. The omentum was replaced, the appendix removed, the sac completely dissected out, and tied off at its neck. The peritoneum was closed with a running catgut suture. The posterior sheaths of the recti and the muscles themselves were approximated with chromic gut sutures. The fascia could only be partly approximated without tension. The gap was filled in with silver wire sutures passed from side to side so as to produce a filigree. The skin was sewed with silk, and a cigarette drain placed at either angle. The wound healed by primary union. Sixteen months have elapsed since the operation; there has been no recurrence, and there has been no discomfort from the silver wire.

CASE III.—William K., 30 years old, admitted January 6, 1905. The man had had an oblique right inguinal hernia for three years, and a similar hernia on the left side for one year. Operation on the right side by Dr. Lilienthal. For the Bassini sutures, instead of chromic gut, twisted silver-wire sutures were used. The operation on the left side was performed by the writer. There was such a wide separation of the deeper structures that it was impossible to approximate them. Accordingly, the gap was bridged over by a continuous suture of silver wire, returning the suture so as to make a sort of figure-of-eight filigree. The superficial fascia was united with catgut and the skin with silk. Both wounds healed by primary union. It will very seldom be necessary to resort to the silver wire in cases of inguinal hernia, but when we have such a case, the silver wire, if used as a filigree and not as approximating sutures, will be found satisfactory. The silver wire used in this case was in the form of a cable of very thin wires, and was devised by Dr. Lilienthal. It is much more pliable than a single strand of heavier wire, and can readily be tied into a knot.

CASE IV.—Louis R., 37 years old, admitted May 5, 1905. Two months before admission the man, while getting off a moving car, was thrown against a steel column. He sustained a fracture of the humerus, dislocation of the clavicle and three upper ribs, and a large ventral hernia in the left iliac fossa. On May 9 1

performed a partial excision of the clavicle and three upper ribs. Eight days later I exposed the ventral hernia through a three-inch transverse incision. The peritoneum was not opened. A silver wire filigree two by three and a half inches was placed between the peritoneum and the transversalis. The external oblique was approximated with a running suture of silver wire, and the skin with silk. The wound healed by primary union, and the man has suffered no discomfort from the wire.

CASE V.—Tony M., 24 years old, admitted July 10, 1905. In 1901 the girl had been operated on for appendicitis. A year later a hernia developed in the scar; it had always been reducible until two weeks before admission. At that time the mass suddenly increased in size, the bowels could not be moved and vomiting set in. The hernia was five inches wide and three inches long. On the surface of the mass there were several small ulcers. Operation, July 12, 1905. Hernioplasty with resection of gut for large ventral hernia with gangrene of gut. The hernia was found to consist of several loops of firmly adherent small intestine. One loop had perforated the skin and formed the large ulcer on the surface of the skin. On account of its poor condition six inches of this loop, together with the adherent skin, were resected. End-to-end anastomosis with the Connell suture was done. The circulation in the adjacent portion of the gut was none too good, and accordingly two pieces of rubber dam were placed around the suture line. As the patient's condition was not very good, and as the operation had already consumed considerable time, it was decided to use silver wire to close the abdominal wall. The hernial ring was freed as well as possible and through-and-through silver-wire sutures were passed from side to side. In this way the greater part of the opening was closed. The rubber-dam drains emerged at the centre of the ring. The skin was sutured with silk. For two weeks there was a fecal discharge from the wound. Thereafter the wound healed steadily, and the patient left the hospital with a completely healed wound on August 16, 1905. Since then the girl has been doing arduous housework, including the lifting of heavy weights and the scrubbing of floors, without any pain or discomfort.

CASE VI.—Goble R., 30 years old, admitted October 3, 1905. The patient had an umbilical hernia of five years standing. Five

days before admission the hernia for the first time had become irreducible. The bowels could not be moved, and vomiting set in. The hernia was the size of an orange, tense and tender. Operation on October 3, 1905. The sac was filled with omentum and one loop of small intestine. The intestine was replaced and the omentum resected. Three sutures of silver wire almost completely obliterated the diastasis at the neck of the sac. A few catgut sutures approximated the superficial tissues. A small cigarette drain was introduced and the skin sutured with silk. The wound was entirely healed in sixteen days. It would not have been possible in this case to have brought the fascia together in any other manner. Three months later after a severe attack of bronchitis the patient developed a small hernia just below the umbilicus. Had I put in a filigree besides the silver-wire sutures, this would not have occurred.

CASE VII.—Mary M., 27 years old, admitted October 3, 1905. Two weeks before admission the woman noticed a mass in the right hypochondrium and epigastrium. The mass was hard, smooth, adherent to the abdominal wall, and measured about three by five inches. On January 31, 1906, the tumor was excised through a vertical incision in the right hypochondrium. The tumor involved the right rectus and the adjoining portions of the oblique muscles; it was also adherent to the parietal peritoneum. Portions of the oblique muscles, the rectus together with both its sheaths, and the adherent peritoneum, were removed with the tumor in one piece. It was only with difficulty that the peritoneum could be brought together with catgut sutures. A filigree was then placed in the depth of the wound, and a second filigree made by passing running sutures of silver wire through the oblique muscles. A drain was introduced at either angle, and the skin approximated with zinc oxide plaster. Recovery was uneventful. The pathologist of the hospital, Dr. Manillebaum, reported the tumor to be an inflamed fibroma.

The writer believes it can be safely said that if the silver-wire filigree be correctly made and correctly introduced, it will seldom be necessary to subsequently remove it. If, furthermore, the precaution be taken of introducing two separate

filigree in different planes, then the large majority of otherwise inoperable hernie will be radically cured. With careful attention to a few technical details we have in the use of the filigree a rapid, safe, and efficient method of curing large hernie, and one that deserves, in properly-selected cases, the hearty approval of every surgeon.

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